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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/711,023	08/18/2004	Evan G. Colgan	FIS920040078US1	5022

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EXAMINER

MANDALA, VICTOR A

ART UNIT PAPER NUMBER

2826

DATE MAILED: 08/11/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/711,023

Applicant(s)

COLGAN ET AL.

Examiner

Victor A. Mandala Jr.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 May 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11, 17 and 18 is/are pending in the application.
- 4a) Of the above claim(s) 7, 8, 17 and 18 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6&9-11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

1. The Applicant has amended the claims, but the examiner finds the amendment to not read around the prior art at hand. The rejection below will further reject all of the claims.
2. The examiner has bolded and italicized a suggested amendment that does not change the scope of the independent claims 1 and 11, but helps clarify the original amendment.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 4, and 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese Patent No. 2004-172489 Naoto, (Japanese Patent Office Computer Translation).

3. Referring to claim 1, Naoto teaches an electronic packaging structure comprising: a chip carrier, (Figure 5 #1); at least two semiconductor devices, (Figure 5 #6 & 7), attached to said chip carrier, (Figure 5 #1), where at least one of said at least two semiconductor devices, (Figure 5 #6 & 7), is a lower power density device, (Figure 5 #7 and See * below), and at least one of said at least two semiconductor devices is a higher power density device, (Figure 5 #6 and See * below), and said lower power density device, (Figure 5 #7 and See * below), has a reduced thickness than ***the thickness of*** said higher power density device, (Figure 5 #6 and See * below); a heat spreader, (Figure 5 #13), having a substantially planar surface in thermal contact with said

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at least two semiconductor devices, (Figure 5 #6 & 7); and a thermal adhesive layer, (Figure 5 #18), in contact with said heat spreader, (Figure 5 #13), and with said at least two semiconductor devices, (Figure 5 #6 & 7), whereby a semiconductor device, (Figure 5 #6), requiring a lower thermal resistance has a thinner thermal adhesive layer, (Figure 5 #18), than a semiconductor device, (Figure 5 #7), which can tolerate a higher thermal resistance.

* Naoto et al. teaches all of the claimed matter in claims 1 and 11, but is silent to the exact statement that the larger device in Figure 5 #6 is a higher power density device and that the smaller device in Figure 5 #7 is a lower power density device. Naoto et al. does teach that the silver paste is thicker on the smaller device and thinner on the larger device, where it is well known to one having skill in the art at the time the invention was made to know that the thinner paste has less of a thermal resistance than the thicker paste, hence creating a better thermal connection between the device and the heat sink resulting in a lower device temperature and/or larger thermal transfer for the larger device #6 and where it would be also obvious to place a device that has a larger amount of thermal radiation in an area that would reduce the temperature of the device more effectively. It is also well known in the art at the time the invention was made to know that a device having a higher power density would have a larger amount of heat generated by the device than a device that has a lower power density.

4. Referring to claim 4, Naoto teaches a packaging structure of claim 1 wherein said semiconductor devices are selected from the group consisting of integrated circuit chips, capacitors, resistors and thermistors, (Figure 5 #6 & 7).

5. Referring to claim 9, Naoto teaches a packaging structure of claim 1 wherein said heat spreader is the package lid, (Figure 5 #13).

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6. Referring to claim 10, Naoto teaches a packaging structure of claim 1, wherein said lower power density device is approximately 120 microns thinner than said higher power density device, (See ** below).

** Note that the specification contains no disclosure of either the critical nature of the claimed dimensions or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

7. Referring to claim 11, Naoto teaches a method for cooling multiple semiconductor devices, (Figure 5 #6 & 7), with different cooling requirements on a common chip carrier, (Figure 5 #1), with a common lid or heat spreader, (Figure 5 #13), comprising the steps of: providing a chip carrier, (Figure 5 #1); attaching at east two semiconductor devices, (Figure 5 #6 & 7), to said chip carrier, (Figure 5 #1), where at least one of said at least two semiconductor devices, (Figure 5 #6 & 7), is a lower power density device, (Figure 5 #7 and See * above), and at least one of said at least two semiconductor devices is a higher power density device, (Figure 5 #6 and See * above), and said lower power density device, (Figure 5 #7 and See * above), has a reduced thickness than ***the thickness of*** said higher power density device, (Figure 5 #6 and See * above); placing a heat spreader, (Figure 5 #13), having a substantially planar surface in thermal contact with said at least two semiconductor devices, (Figure 5 #6 & 7); and placing a thermal adhesive layer, (Figure 5 #18), in contact with said heat spreader, (Figure 5 #13), and with said at least two semiconductor devices, (Figure 5 #6 & 7), whereby a semiconductor device, (Figure 5

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#6), requiring a lower thermal resistance has a thinner thermal adhesive layer, (Figure 5 #18), than a semiconductor device, (Figure 5 #7), which can tolerate a higher thermal resistance.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese Patent No. 2004-172489 Naoto, (Japanese Patent Office Computer Translation) in view of U.S. Patent No. 6,850,411 Patel.

8. Referring to claim 2, Naoto in view of Patel teaches a packaging structure of claim 1 wherein said chip carrier, (Naoto Figure 5 #1 and Patel Figure 1 #12), is a ceramic chip carrier, (Patel Col. 4 Lines 25-28 and See * below).

* Naoto discloses the claimed invention except for the chip carrier being made out of a material selected from the group consisting of ceramic or organic materials. It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the teachings of Patel with the teachings of Naoto to make the chip carrier out of a material selected from the group consisting of ceramic or organic materials because these materials have high thermal conductive properties and high stress tolerances, and since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

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9. Referring to claim 3, Naoto in view of Patel teaches a packaging structure of claim 1 wherein said chip carrier, (Naoto Figure 5 #1 and Patel Figure 1 #12), is an organic chip carrier, (Patel Col. 4 Lines 25-28 and See * above).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese Patent No. 2004-172489 Naoto, (Japanese Patent Office Computer Translation) in view of U.S. Patent No. 6,292,369 Daves et al.

10. Referring to claim 5, Naoto in view of Daves et al. teaches a packaging structure of claim 1 wherein said heat spreader, (Naoto Figure 5 #13 and Daves et al. Figure 7 #104), is comprised of material selected from the group consisting of diamond, Si, SiC, Mo, ceramic and composites containing these materials, (Daves et al. Col. 5 Lines 65-67 and see ** below).

** Naoto discloses the claimed invention except for the heat spreader being made out of a material selected from the group consisting of diamond, Si, SiC, Mo, ceramic and composites containing these materials. It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the teachings of Daves et al. with the teachings of Naoto to make the heat spreader out of a material selected from the group consisting of diamond, Si, SiC, Mo, ceramic and composites containing these materials because these materials have

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high thermal conductive properties and high stress tolerances, and since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese Patent No. 2004-172489 Naoto, (Japanese Patent Office Computer Translation) in view of U.S. Patent No. 5,098,609 Iruvanti et al.

11. Referring to claim 6, a packaging structure of claim 1 wherein said thermal adhesive layer, (Naoto Figure 5 #18), is comprised of a material selected from the group consisting of Ag filled epoxy, filled thermoplastic, filled polymer, filled polymer adhesive, metal and solder, (See */* below).

/ Naoto discloses the claimed invention except for the thermal adhesive layer being made out of a material selected from the group consisting of Ag filled epoxy, filled thermoplastic, filled polymer, filled polymer adhesive, metal and solder. It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the teachings of Iruvanti et al. with the teachings of Naoto to make the thermal adhesive layer out of a material selected from the group consisting of Ag filled epoxy, filled thermoplastic, filled polymer, filled

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polymer adhesive, metal and solder because these materials have high thermal conductive properties and high stress tolerances, and since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Patent No. 6,480,672 Rosenzweig et al. is used as evidence that a larger power density emits more heat than a lower power density device.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Victor A. Mandala Jr. whose telephone number is (571) 272-1918. The examiner can normally be reached on Monday through Thursday from 8am till 6pm..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan J. Flynn can be reached on (571) 272-1915. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

VAMJ
7/06/06


EVAN PERT
PRIMARY EXAMINER